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Research Abstracts

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CURRENT NACA REPORTS

NACA Rept. 1131

DEFLECTION AND STRESS ANALYSIS OF THIN SOLID WINGS OF ARBITRARY PLAN FORM WITH PARTICULAR REFERENCE TO DELTA WINGS. Manuel Stein, J. Edward Anderson and John M. Hedgepeth. 1953. ii, 20p. diagrs., photo. (NACA Rept. 1131. Formerly TN 2621)

The structural analysis of arbitrary solid cantilever wings by small-deflection thin-plate theory is reduced to the solution of linear ordinary differential equations by the assumption that the chordwise deflections at any spanwise station may be expressed in the form of a power series in which the coefficients are functions of the spanwise coordinate. Experimental deflection and stress data for constant-thickness delta-plate specimens of 45° and 60° sweep are presented and are found to compare favorably with the present theory.

NACA Rept. 1137

INITIAL RESULTS OF INSTRUMENT-FLYING TRIALS CONDUCTED IN A SINGLE-ROTOR HELICOPTER. Almer D. Crim, John P. Reeder and James B. Whitten. 1953. ii, 7p., diagrs., photos. (NACA Rept. 1137. Formerly TN 2721.)

Instrument-flying trials were conducted in a single-rotor helicopter, the maneuver stability of which could be changed from satisfactory to unsatisfactory. Results indicated that existing longitudinal flying-qualities requirements based on contact flight were adequate for instrument flight at speeds above that for minimum power. Lateral-directional problems were encountered at low speeds. The conclusion was reached that special helicopter instruments would be desirable under all conditions and necessary for sustained low-speed instrument flight.

NACA Rept. 1138

STUDY OF INADVERTENT SPEED INCREASES IN TRANSPORT OPERATION. Henry A. Pearson. 1953. ii, 11p. diagrs., tab. (NACA Rept. 1138. Formerly TN 2638)

Factors relating to inadvertent speed and Mach number increases in transport operation are discussed with the object of indicating the manner in which they might vary with different qualities of the airplane and the minimum margins required to guard against reaching unsafe values. Speed increments and the margins required under several assumed conditions are investigated. Results indicate that smaller margins should be required of high-speed airplanes than of low-speed airplanes to prevent overspeeding in inadvertent maneuvers. The possibility of exceeding placard speed in prolonged descents is illustrated by computations for typical transport airplanes. Equations are suggested that allow estimates to be made of the necessary speed margins.

NACA Rept. 1147

THE SIMILARITY LAW FOR HYPERSONIC FLOW AND REQUIREMENTS FOR DYNAMIC SIMILARITY OF RELATED BODIES IN FREE FLIGHT. Frank M. Hamaker, Stanford E. Neice and Thomas J. Wong. 1953. ii, 11p. diagrs. (NACA Rept. 1147. Formerly TN 2443; TN 2631)

The similarity law for nonsteady, inviscid, hypersonic flow about slender three-dimensional shapes is derived. Conclusions drawn are shown to be valid for rotational flow. Requirements for dynamic similarity of related shapes in free flight are obtained. The law is examined for steady flow about related three-dimensional shapes. Results of an experimental investigation of the pressures acting on two inclined cones are found to check the law as it applies to bodies of revolution.

NACA RM E53L31a

INVESTIGATION OF EFFECT OF NOTCHES ON ELEVATED-TEMPERATURE FATIGUE STRENGTH OF N-155 ALLOY. C. A. Hoffman. April 1954. 8p. diagrs., tab. (NACA RM E53L31a)

An investigation of the effect of notches on the fatigue strength of N-155 alloy at elevated temperatures was conducted by the NACA in cooperation with the Gas Turbine Panel of the joint A.S.T.M.-A.S.M.E. Committee on Effects of Temperature on the Properties of Metals. Studies were made at 1350° and 1500° F in completely reversed bending. The results on relatively few specimens indicated that: (a) Notches reduced fatigue strength at 1350° F by approximately 34 to 40 percent and at 1500° F by approximately 30 to 37 percent over the range of 3 to 150 hours, and (b) the notch sensitivity in fatigue under conditions of completely reversed bending at 1350° and 1500° F was considerably less than that predicted for static bending under elastic conditions.

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NACA TN 3076

LIFT AND MOMENT COEFFICIENTS EXPANDED TO THE SEVENTH POWER OF FREQUENCY FOR OSCILLATING RECTANGULAR WINGS IN SUPERSONIC FLOW AND APPLIED TO A SPECIFIC FLUTTER PROBLEM. Herbert C. Nelson, Ruby A. Rainey and Charles E. Watkins. April 1954. 53p. diagrs. (NACA TN 3076)

Linearized theory for compressible unsteady flow is used to derive the velocity potential and lift and moment coefficients in the form of power series in terms of the frequency of oscillation for a harmonically oscillating rectangular wing moving at a constant supersonic speed. Closed expressions for the velocity potential and lift and moment coefficients associated with pitching and translation are given to the seventh power of the frequency. These expressions extend the range of usefulness of NACA Report 1028 in which similar expressions were derived to the third power of the frequency of oscillation. The section and total lift and moment coefficients are discussed with the aid of several figures. In addition, flutter speeds obtained in the Mach number range from 10/9 to 10/6 for a rectangular wing of aspect ratio 4.53 by using section coefficients derived on the basis of three-dimensional flow are compared with flutter speeds for this wing obtained by using coefficients derived on the basis of two-dimensional flow.

NACA TN 3078

TRANSIENT TEMPERATURES IN HEAT EXCHANGERS FOR SUPERSONIC BLOWDOWN TUNNELS. Joseph H. Judd. April 1954. 35p. diagrs., 2 tabs. (NACA TN 3078)

A method has been presented for the computation of tube and fluid temperatures for fluid flowing through heat exchangers of the heat-accumulator type in which the temperatures are low enough so that radiation may be neglected. Three entrance air conditions were considered, constant temperature, exponentially decreasing temperature, and linearly decreasing temperature. Agreement was found between experimental and computed tube and air temperatures for inlet air at constant temperature and at atmospheric pressure.

NACA TN 3084

A METHOD FOR MEASURING THE PRODUCT OF INERTIA AND THE INCLINATION OF THE PRINCIPAL LONGITUDINAL AXIS OF INERTIA OF AN AIRPLANE. Robert W. Boucher, Drexel A. Rich, Harold L. Crane and Cloyce E. Matheny. April 1954. 39p. diagrs., photos., 6 tabs. (NACA TN 3084)

An analysis has been made of a method for experimentally determining the moments of inertia and the product of inertia about the body reference axes, the moments of inertia about the principal axes, and the inclination of the principal longitudinal axis. The results of the application of this method and the associated equipment and techniques are discussed for both a simple model and a conventional airplane.

NACA TN 3085

AN EXPERIMENTAL STUDY OF POROSITY CHARACTERISTICS OF PERFORATED MATERIALS IN NORMAL AND PARALLEL FLOW. George M. Stokes, Don D. Davis, Jr. and Thomas B. Sellers. April 1954. 24p. diagrs., photos. (NACA TN 3085. Formerly RM L53H07)

Experimental data have been obtained to show some of the flow characteristics of perforated materials when subjected to airstreams directed normal and parallel to the surface of the material. The results of these tests showed that the effective porosity of the material dropped markedly as the stream velocity increased. The most important parameter for determining the discharge coefficients of the perforated material was the ratio of the stream velocity to the free jet velocity.

NACA TN 3110

TRENDS OF ROLLING-CONTACT BEARINGS AS APPLIED TO AIRCRAFT GAS-TURBINE ENGINES. (Papers presented at the SAE Summer Meeting, Atlantic City, N.J., 1952). Panel on High-Speed Rolling-Contact Bearings. Appendix A. PROBLEMS PERTAINING TO HIGH-SPEED ROLLING-CONTACT AIRCRAFT BEARINGS OF CONCERN TO THE BEARING INDUSTRY. Daniel Gurney, Marlin-Rockwell Corp. Appendix B. PROBLEMS PERTAINING TO HIGH-SPEED ROLLING-CONTACT BEARINGS IN AIRCRAFT TURBINE ENGINES OF CONCERN TO THE MILITARY. C. M. Michaels, Wright Air Development Center. Appendix C. ROLLING-CONTACT BEARINGS AS APPLIED TO AIRCRAFT GAS TURBINES FROM THE ENGINE MANUFACTURER'S POINT OF VIEW. Stephen Drabek, General Electric Co. Appendix D. NEW DEVELOPMENTS IN HIGH-SPEED ROLLING-CONTACT BEARINGS. Frank W. Wellons, SKF Industries, Inc. Appendix E. BASIC FRICTION AND WEAR STUDIES OF ROLLING-CONTACT-BEARING CAGE MATERIALS. Robert L. Johnson, Max A. Swikert and Edmond E. Bisson. Appendix F. PRESENT STATUS OF RESEARCH KNOWLEDGE IN THE FIELD OF HIGH-SPEED ROLLING-CONTACT BEARINGS. E. F. Macks. April 1954. (ii), 62p. diagrs., photos. (NACA TN 3110)

Requirements for rolling contact bearings for future aircraft gas-turbine engines are severe. Operating temperatures to 750° F, thrust loads to 50,000 pounds, and DN values to 3.5×10^6 are desired. Cage material compatibility, bearing endurance life, high-temperature lubricants, and lubricant cooling are expected to be the major problems. These and related problems are discussed from the viewpoints of the bearing industry, engine manufacturers, and the military. Some recent research results are given, and the need for further research on an expanded scale is emphasized.

NACA TN 3128

COMPARISON BETWEEN THEORY AND EXPERIMENT FOR INTERFERENCE PRESSURE FIELD BETWEEN WING AND BODY AT SUPERSONIC SPEEDS. William C. Pitts, Jack N. Nielsen and Maurice P. Gionfriddo. April 1954. 64p. diagrs., 2 tabs. (NACA TN 3128)

Pressure-distribution data were obtained for a wing-body combination at Mach numbers 1.48 and 2.00 and at Reynolds numbers 0.6, 1.2, and 1.5 x 10^6. The model was a single-wedge, rectangular wing mounted on a cylindrical body with an ogival nose. The body angle of attack ranged between +6° and -6° and the wing-incidence angle ranged from 0° to -5.7°. The experimental pressure-distribution and span-loading results are compared with the linear, wing-body interference theory of NACA TN 2677.

NACA TN 3146

NOTE ON THE AERODYNAMIC HEATING OF AN OSCILLATING SURFACE. Simon Ostrach. April 1954. 12p. (NACA TN 3146)

An analysis of the temperature distributions in a fluid over an oscillating surface with heat transfer is made and associated heat-transfer parameters are compared with those for the case of conduction at a stationary surface with the same initial temperature potential. It is found that the heat transfer for the oscillating surface can be considerably different from that for conduction alone. The effect of the surface oscillations on the thermal state of the fluid is studied by means of average static- or total-temperature defects, and it is demonstrated that the oscillations could alter the fluid temperature appreciably.

NACA TN 3165

PRELIMINARY INVESTIGATION OF THE EFFECTS OF HEAT TRANSFER ON BOUNDARY-LAYER TRANSITION ON A PARABOLIC BODY OF REVOLUTION (NACA RM-10) AT A MACH NUMBER OF 1.61. K. R. Czarnecki and Archibald R. Sinclair. April 1954. 23p. diagrs., photos., tab. (NACA TN 3165. Formerly RM L52E29a)

This paper presents the results of a preliminary investigation of the effects of heat transfer on boundary layer transition on a parabolic body of revolution (NACA RM-10) at Mach number of 1.61. This paper includes also a study of the effectiveness of cooling on boundary-layer transition with model surface roughened and a comparison of the results obtained in this investigation with other available theoretical and experimental data.

NACA TN 3166

AN EXTENSION OF THE INVESTIGATION OF THE EFFECTS OF HEAT TRANSFER ON BOUNDARY-LAYER TRANSITION ON A PARABOLIC BODY OF REVOLUTION (NACA RM-10) AT A MACH NUMBER OF 1.61. K. R. Czarnecki and Archibald R. Sinclair. April 1954. 21p. diagrs., photo. (NACA TN 3166. Formerly NACA RM L53B25)

This paper covers the extension of a previous investigation of the effects of heat transfer on boundary-layer transition to higher Reynolds numbers, to greater amounts of heating, and to a more extensive study of the effects of surface roughness and wind-tunnel flow disturbances. The tests were made at a Mach number of 1.6 and over a Reynolds number range from 2.5 x 10^6 to 35 x 10^6. A comparison is made between the experimental results and theory.

NACA TN 3170

AN EXPERIMENTAL INVESTIGATION AT LOW SPEEDS OF THE EFFECTS OF LIP SHAPE ON THE DRAG AND PRESSURE RECOVERY OF A NOSE INLET IN A BODY OF REVOLUTION. James R. Blackaby and Earl C. Watson. April 1954. 48p. diagrs., photos. (NACA TN 3170)

A low-speed investigation, for an angle of attack and angle of yaw of 0°, was made of the effects of inlet lip bluntness and profile on the performance of a ducted body of revolution. A sharp inlet lip profile was tested in addition to five circular-arc profiles having contraction ratios (ratio of area at inlet leading edge to minimum inlet area) of about 1.04, 1.08, 1.16, 1.24, and 1.33, and two lips with elliptical internal profiles and approximately elliptical external profiles having contraction ratios of about 1.08 and 1.18.

NACA TN 3172

EFFECTS OF LEADING-EDGE RADIUS AND MAXIMUM THICKNESS-CHORD RATIO ON THE VARIATION WITH MACH NUMBER OF THE AERODYNAMIC CHARACTERISTICS OF SEVERAL THIN NACA AIRFOIL SECTIONS. Robert E. Berggren and Donald J. Graham. April 1954. 65p. diagrs., 7 tabs. (NACA TN 3172. Formerly RM A50D04)

The results of a wind-tunnel investigation at Mach numbers to approximately 0.9 and Reynolds numbers from 1 x 10^6 to 2 x 10^6 indicate no significant effects of leading-edge-radius variation on the variation with Mach number of the aerodynamic characteristics of 4- and 6-percent-chord-thick NACA 4-digit-series airfoil sections. The results indicate beneficial effects of maximum thickness reduction on lift and drag characteristics and no important effects on moment characteristics.

BRITISH REPORTS

N-28442*

SURFACE DEFECTS IN VENEERING. R. J. Newall, Forest Products Laboratory. (Reprint from Wood, v. 18, December 1953, p. 462-465)

Examination of defective veneering shows that there are two main types of defect: (1) checking or cracking of the veneered surface and (2) shallow furrows in the surface. These defects are discussed in detail and suggestions are made for their elimination. It is indicated that the cause of the defects is that the moisture content of the base material might be too high when the veneer is applied.

N-30304*

National Gas Turbine Establishment (Gt. Brit.)
A CORRELATION OF THE PERFORMANCE OF TWO AIR BLAST ATOMISERS WITH MIXING SECTIONS OF DIFFERENT SIZE. A. Radcliffe and H. Clare. October 1953. 39p. diagrs., tab. (NGTE R.144)

The work on the N.G.T.E. air blast atomizer has been extended and the effect of increasing the orifice diameter has been examined. It is shown that the main factor controlling atomization is the air:fuel ratio and that when this is 0.1 the Sauter mean diameter is about 100 microns. This is for fuel of viscosity 20 to 40 centistokes. The droplet size increases approximately as the square root of the linear dimensions of the orifice and mixing section.

N-30305*

National Gas Turbine Establishment (Gt. Brit.)
CALCULATED PRESSURE, AREA AND IMPULSE RATIOS FOR SUPER-CRITICAL EXPANSION OF COMBUSTION GASES. A. B. P. Beeton. November 1953. 31p. diagrs., 3 tabs. (NGTE R. 145)

Expansion conditions beyond the throat of convergent-divergent exit nozzles are studied. Assuming isentropic flow, theoretical values have been calculated relating the flow area, impulse and pressure for combustion gases expanded down to supercritical pressure ratios. The results are expressed in the form of two master curves which apply to 20:1 air/fuel ratio, 450° K initial air temperature and 1 atmosphere total pressure. Additional curves are given to derive an additive correction for any air/fuel ratio between 10:1 and 50:1. The range covered is from the throat down to about 12:1 pressure ratio.

N-30307*

National Gas Turbine Establishment (Gt. Brit.)
THE FATIGUE PROPERTIES OF INVESTMENT-CAST 0.2 PER CENT CARBON, 18 PER CENT CHROMIUM, 2 PER CENT NICKEL STAINLESS STEEL AND THEIR IMPROVEMENT BY NITRIDING AND SHOT-PEENING. T. Fitzgerald and J. E. Northwood. October 1953. 46p. diagrs., photos., 6 tabs. (NGTE Memo. M. 162)

Low fatigue properties have been obtained with the 0.2-percent carbon, 18-percent chromium, 2-percent nickel stainless steel in the investment cast and heat treated condition. Attempts have been made to improve its fatigue strength by processes which increase the endurance ratio, without any serious effect on tensile properties and ductility. Fatigue tests have shown that nitriding or shot-peening can be used to increase the fatigue strength of investment cast blades to a level on a par with that of the wrought material. The increase in fatigue strength brought about by either of these processes was partly controlled by the condition of the metal surface prior to treatment, increases in fatigue strength of up to 40 percent above that of the "as cast" surface condition being obtained by nitriding or peening the surfaces of buffed or electrolytically polished blades and test pieces.

N-30309*

Aeronautical Research Council (Gt. Brit.)
LIQUID MANOMETERS WITH HIGH SENSITIVITY AND SMALL TIME-LAG. F. A. MacMillan. August 14, 1953. 14p. diagrs., photos. (ARC 16,091; TP 404; FM 1941)

For some purposes a sensitive manometer is required having a small time lag when connected to a small bore tube or orifice. The time lag which can be tolerated is limited by the rate of change of the zero reading. Some problems in the design of a manometer with small time lag and small rate of change of zero reading are discussed, and some general principles of design are derived. It is shown that with a null-reading inclined-tube manometer, changes of zero reading due to variation of temperature can be eliminated by correct choice of the manometer dimensions. A manometer designed according to the principles derived is described; this has a small time lag, a range of 2.5 cm of liquid, and a sensitivity of 0.0005 cm of liquid.

UNPUBLISHED PAPERS

N-19795*

THE CURRENT FORCE FOR PARALLEL AND CONCENTRIC CONDUCTORS. (Die Stromkraft bei parallelen und konzentrischen Leitern). Wilhelm Beetz. April 1954. 10p. diagrs. (Trans. from Elektrotechnik und Maschinenbau, v. 48, no. 33, August 1930, p. 761-763)

The repellent force for parallel and concentric conductors is calculated by substitution of an "effective distance" instead of the actual distance into the formula valid for dimensionless conductors. The influence of the current displacement in case of technical frequencies is discussed.

N-29585*

FATIGUE TESTS ON MULTIPLE-RIVETED JOINTS OF 75 S-T ALUMINUM ALLOY. (Utmattningsprov Pa Flerradigt Nitförband Av Material 75 S). Gunnar Wallgren. March 1954. 15p. diagrs., 2 tabs. (Trans. from Flygtekniska Försöksanstalten, Stockholm, February 21, 1947, Rept. HU-220)

Wöhler curves were determined for two types of riveted joints of 75-ST aluminum alloy under pulsating tension load. The static breaking limit of the joints was also determined.

N-29811*

PRESSURE ERRORS IN PNEUMATIC MEASURING INSTALLATIONS IN FLIGHT TESTS AND IN THE WIND TUNNEL. (Druckfälschung in pneumatischen Messanlagen im Flugversuch und im Windkanal). Helmut Danielzig. April 1954. 65p. diagrs., 9 tabs. (Trans. from ZWB, Berlin, FB 1907, December 8, 1943)

A theoretical method is developed which makes it possible for the engineer working in flight measurements to estimate pneumatically measured quantities like dynamic pressure, static pressure, angle of attack, or angle of sideslip with respect to the error caused by tube friction which is inherent in the measuring method. The theoretical results given in this report have been compared to examples from flight-measurement operation and from wind tunnels.

MISCELLANEOUS

NACA Rept. 1147

Errata No. 1 on "THE SIMILARITY LAW FOR HYPERSONIC FLOW AND REQUIREMENTS FOR DYNAMIC SIMILARITY OF RELATED BODIES IN FREE FLIGHT." Frank M. Hamaker, Stanford E. Neice and Thomas J. Wong. 1953.

NACA RM L53E07b

Errata No. 1 on "ANALYTICAL STUDY OF CLOCKAGE- AND LIFT-INTERFERENCE CORRECTIONS FOR SLOTTED TUNNELS OBTAINED BY THE SUBSTITUTION OF AN EQUIVALENT HOMOGENEOUS BOUNDARY FOR THE DISCRETE SLOTS." Don D. Davis, Jr. and Dewey Moore. June 29, 1953.

DECLASSIFIED NACA REPORTS

NACA RM L8J06

NACA TRANSONIC WIND-TUNNEL TEST SECTIONS. Ray H. Wright and Vernon G. Ward. October 25, 1948. 93p. diagrs., photos., 3 tabs. (NACA RM L8J06) (Declassified from Confidential, 3/10/54)

An approximate subsonic theory has been developed for the solid blockage in a circular wind tunnel with walls slotted in the direction of flow. In tests of a tunnel based on this theory, a prediction of the theory regarding the possibility of practical elimination of the interference due to solid blockage has been realized. Choking limitations did not occur in the slotted tunnel, and it could be operated with continuous Mach number variation up to low supersonic Mach numbers merely by varying the power. Pressure distributions over the surface of a nonlifting model in the slotted tunnel were compared with those obtained over the same model in a much larger tunnel where the interference was negligibte.

NACA RM L9D18

PRELIMINARY INVESTIGATION OF 3-INCH SLOTTED TRANSONIC WIND-TUNNEL TEST SECTIONS. George P. Bates. September 9, 1949. 18p. diagrs. (NACA RM L9D18) (Declassified from Confidential, 3/10/54)

An investigation has been made on two slotted test sections in a 3-inch circular blowdown apparatus to determine the characteristics of slotted throats for transonic and supersonic operation. One of the sections investigated had 20 slots, with 1/5-open wall area, while the other section had 8 slots and was 1/8 open.

NACA RM L9D29a

PRELIMINARY INVESTIGATION OF A VARIABLE MACH NUMBER TWO-DIMENSIONAL SUPERSONIC TUNNEL OF FIXED GEOMETRY. William J. Nelson and Frederick Bloetscher. June 9, 1949. 54p. diagrs., photos. (NACA RM L9D29a) (Declassified from Confidential, 3/10/54)

Variable Mach number supersonic flows have been generated in a 2-1/4 by 4-1/2 inch fixed-geometry rectangular channel by removal of air through longitudinal slots of several profiles and proportions. The nature of the flow over a range of Mach numbers up to 1.45 is shown in schlieren photographs and pressure distributions along the channel. The most uniform flow was produced by removal of air through a single slot in a flat surface.

NACA RM L50B01

PRELIMINARY INVESTIGATION OF CONSTANT-GEOMETRY, VARIABLE MACH NUMBER, SUPERSONIC TUNNEL WITH POROUS WALLS. William J. Nelson and Paul L. Klevatt. May 3, 1950. 27p. diagrs., photos. (NACA RM L50B01) (Declassified from Confidential, 3/10/54)

A method of generating variable Mach number supersonic flow in a channel of fixed geometry by the removal of air through uniform porous walls is discussed. Calculated porosity distributions are presented for several minimum-length nozzles designed to operate at Mach numbers up to 2.0. The axial pressure gradient has been calculated for several constant-porosity walls over a range of Mach numbers. The applicability of these calculations to a two-dimensional tunnel is illustrated by comparison of calculated and experimentally determined pressure gradients in the 2-1/4 by 4-1/2 inch channel at Mach numbers in the range covered in the present tests, 0.99 to 1.17. Schlieren photographs of the flow in the experimental channel are also presented.

NACA RM L50D27

PRELIMINARY INVESTIGATION OF POROUS WALLS AS A MEANS OF REDUCING TUNNEL BOUNDARY EFFECTS AT LOW-SUPERSONIC MACH NUMBERS. William J. Nelson and Frederick Bloetscher. September 13, 1950. 21p. diagrs., photos. (NACA RM L50D27) (Declassified from Confidential, 3/10/54)

The use of porous-walled tunnels at supersonic Mach numbers as a means of avoiding reflection of stream disturbance extending to the walls is discussed. Calculated shock-reflection characteristics of porous materials are presented in the form of design charts for Mach numbers up to 1.5 and incident shock deviations up to 6°. Shocks reflected from sintered-bronze and bonded-screen walls at a Mach number of 1.2 are consistent with the calculated reflections.

NACA RM L50G19a

PRELIMINARY INVESTIGATION OF REFLECTIONS OF OBLIQUE WAVES FROM A POROUS WALL. Don D. Davis, Jr. and George P. Wood. November 9, 1950. 33p. diagrs., photos. (NACA RM L50G19a) (Declassified from Confidential, 3/10/54)

A porous wall was used in an attempt to eliminate reflections of oblique waves from a tunnel wall. Calculations were made of the required resistance characteristics of a wall in order that the flow through the wall, due to the pressure difference across a shock wave, would equal the component normal to the wall of the flow behind the shock wave. The resistance characteristic of a sintered-bronze wall was measured and the reflections of waves impinging on the wall were observed at a Mach number of 1.62. The intensity of the reflections was greatly reduced by permitting flow through the wall.

NACA RM L51F14

COMPARISON OF TRANSONIC CHARACTERISTICS OF LIFTING WINGS FROM EXPERIMENTS IN A SMALL SLOTTED TUNNEL AND THE LANGLEY HIGH-SPEED 7- BY 10-FOOT TUNNEL. William C. Sleeman, Jr., Paul L. Klevatt and Edward L. Linsley. November 5, 1951. 44p. diagrs., photos. (NACA RM L51F14) (Declassified from Confidential, 3/10/54)

A comparison is made of the transonic aerodynamic characteristics of two unswept and two 45° swept-back wings tested in a 4.5- by 6.25-inch slotted tunnel over a Mach number range from 0.70 to 1.30 and the Langley high-speed 7- by 10-foot tunnel sidewall reflection plane up to $M = 1.08$. Two geometrically similar wings having a semispan of 4.24 and 2.55 inches for both sweep angles were tested to investigate effects of model size in the slotted tunnel. Two slot areas, 1/8 and 1/5 of the horizontal boundaries open, were used in the tests.

NACA RM L52C18

AN EXPERIMENTAL INVESTIGATION OF THE ZERO-LIFT PRESSURE DISTRIBUTION OVER A WEDGE AIRFOIL IN CLOSED, SLOTTED, AND OPEN-THROAT TUNNELS AT TRANSONIC MACH NUMBERS. William J. Nelson and Frederick Bloetscher. June 16, 1952. 34p. diagrs., photos. (NACA RM L52C18) (Declassified from Confidential, 3/10/54)

Pressure distributions and schlieren photographs of the flow about a 10-percent-thick diamond airfoil at zero lift in two-dimensional closed, slotted, and open-throat tunnels are presented and discussed. Uncorrected airfoil pressures obtained in 1/5- and 1/8-open slotted throat tunnels are compared at subsonic Mach numbers with corrected results from open and closed test sections of the same dimensions. The effect of varying the slot width has been investigated at Mach numbers up to 0.92. At Mach numbers up to 1.18, data obtained in test sections whose upper and lower boundaries were slotted to provide openings the combined width of which was equal to 1/8 of the tunnel width are shown to be consistent with theory and available experiments.

NACA RM L52E27

REFLECTION OF SHOCK WAVES FROM SLOTTED WALLS AT MACH NUMBER 1.62. George P. Wood. July 21, 1952. 16p. diagrs., photos. (NACA RM L52E27) (Declassified from Confidential, 3/10/54)

A brief study was made of the effect of slots in a test-section wall on the reflection from the wall of an incident oblique shock wave at a free-stream Mach number of 1.62. The reflection was observed with an interferometer for various combinations of slot width, spacing, and contour. The reflections from the open and closed portions of the wall, being at different angles to the wall, were not superposed and, therefore, did not cancel each other.

NACA RM L53A26

THEORETICAL STUDY OF THE TUNNEL-BOUNDARY LIFT INTERFERENCE DUE TO SLOTTED WALLS IN THE PRESENCE OF THE TRAILING-VORTEX SYSTEM OF A LIFTING MODEL. Clarence W. Matthews. April 7, 1953. 56p. diagrs. (NACA RM L53A26) (Declassified from Confidential, 3/10/54)

The equations which represent the interference on the lift of uniformly loaded wings of finite span in circular tunnels with mixed open and closed boundaries are derived, with special attention to those tunnels containing symmetrical arrangements of the open and closed portions. The equations are applicable to tunnels with other cross-sectional shapes, provided a transformation function can be found which will transform the tunnel cross section into a circle.

NACA RM L53E07b

ANALYTICAL STUDY OF BLOCKAGE- AND LIFT-INTERFERENCE CORRECTIONS FOR SLOTTED TUNNELS OBTAINED BY THE SUBSTITUTION OF AN EQUIVALENT HOMOGENEOUS BOUNDARY FOR THE DISCRETE SLOTS. Don D. Davis, Jr. and Dewey Moore. June 29, 1953. 57p. diagrs. (NACA RM L53E07b) (Declassified from Confidential, 3/10/54)

Numerical results are presented for the boundary interference on lifting wings and for the solid-blockage interference for a doublet on the tunnel axis in circular, rectangular, and two-dimensional slotted tunnels. In the analysis, an equivalent homogeneous wall has been substituted for the physical boundary of discrete slots. The results are found to be consistent with those calculated for the discrete slots and with available experimental results.

NACA RM A53E29

WALL INTERFERENCE IN WIND TUNNELS WITH SLOTTED AND POROUS BOUNDARIES AT SUBSONIC SPEEDS. Barrett S. Baldwin, Jr., John B. Turner and Earl D. Knechtel. October 9, 1953. 42p. diagrs. (NACA RM A53E29) (Declassified from Confidential, 3/10/54)

Linearized compressible-flow analysis is applied to the study of wind-tunnel-wall interference for subsonic flow in either two-dimensional or circular test sections having slotted or porous walls. Expressions are developed for evaluating blockage and lift interference.